

Adoption and Acceptance of Artificial Intelligence Literacy for Enhancing Learning Effectiveness Among Distance Learners in Nigeria

T. G., Muibi

Department of Adult Education, University of Ibadan, Nigeria

Abstract

AI literacy has come to stay as a means of teaching and learning in this digital age. It has the potential to enable learners to become self-regulated, think critically, receive more personalized learning experiences, and improve learning outcomes. AI literacy is the awareness, knowledge, skills, and ethical understanding needed to actively participate in and manage AI- based tools in education. Recognition of AI literacy in terms of awareness, competence and ethical knowledge forms the foundation on which successful adoption of AI-based learning systems relies. Therefore, acceptance is the attitudinal and psychological foundation for adoption, suggesting that without it, actual behavioral adoption would not be forthcoming. Adoption, therefore, is the behavioral expression of acceptance, the manner by which learners adopt AI knowledge and tools as part of their learning behavior. Therefore, making learning more effective for open distance learners with the use of AI tools would starts with the learners' knowledge of what brought about AI, its emergence, expansion and integration, the definition, its application in education, types of AI technologies used in teaching and learning, the role of AI learners' exposure to awareness, adoption and acceptance, learners' education/training programmes on exposure to AI usage, social media/online communities of learners' exposure influence on AI usage, challenges facing learners' acceptance and adoption of AI literacy, the potential factors influencing the promotion of AI literacy adoption and acceptance with conclusion and some recommendations on improved teaching and learning condition in the digital world.

Keywords: Artificial Intelligence literacy, learning effectiveness, distance education, technology adoption and acceptance, digital competence, Nigeria.

Introduction

Artificial Intelligence (AI) has emerged as a changing force in education, evolving through decades of theoretical development and technological innovation. Its integration into educational systems has shifted from theoretical possibilities to practical applications that enhance teaching and learning. This evolution can be analyzed through different historical phases. Early Beginnings (1950s–1970s): The origins of AI can be traced back to the 1950s, when researchers began exploring the potential of machines to mimic human intelligence. In Alan Turing's seminal paper, “Computing Machinery and Intelligence”, he examined the theoretical groundwork for AI by introducing the Turing Test, a criterion for determining whether machines could exhibit human-like intelligence (Turing, 1950). By the 1960s, AI research was advancing rapidly, leading to the creation of early AI systems like Logic Theorist and General Problem Solver. These systems aimed to solve problems using logical reasoning, laying the foundation for AI's application in problem-solving and decision-making (McCarthy et al., 1955). The educational potential of AI was first recognized during this period, with researchers envisioning its use in automating instruction and personalizing learning. Early AI in Education (1970s–1980s): The 1970s and 1980s witnessed the development of the first AI-driven educational systems, known as Intelligent Tutoring Systems (ITS). These systems aimed to replicate the behavior of human tutors by providing personalized feedback and adapting instruction to individual learners' needs. SCHOLAR, developed by Carbonell (1970), was one of the earliest ITS and focused on teaching geography through an interactive dialogue system. During this period, the concept of adaptive learning emerged, wherein AI systems could adjust content delivery based on a learner's performance and preferences. However, technological limitations, such as insufficient computing power and lack of large-scale data, restricted the scalability of these systems (Woolf, 1992).

Expansion and Integration (1990s–2000s): The 1990s brought significant advancements in AI, driven by the proliferation of personal computers and the internet. This era marked a shift from standalone ITS to more integrated and networked systems. AI-powered tools such as cognitive tutors became increasingly popular. For instance, the Cognitive Tutor developed by Anderson and his colleagues was used in teaching mathematics, demonstrating the potential of AI to improve student outcomes through personalized learning paths (Anderson et al., 1995). Moreover, the rise of multimedia and interactive technologies allowed for the integration of AI into online learning platforms. Virtual learning environments, such as Blackboard and Moodle, began incorporating

AI-driven analytics to monitor student progress and suggest interventions (Kay et al., 2006).

Modern Developments (2010s–Present): The 2010s marked a transformative phase for AI in education, fueled by advancements in machine learning, natural language processing, and big data analytics. AI-powered educational technologies became more sophisticated, capable of performing tasks such as automated grading, content recommendation, and predictive analytics. Platforms like Duolingo and Khan Academy leveraged AI algorithms to offer personalized learning experiences to millions of users worldwide. For instance, Duolingo uses AI to adapt language lessons to individual learners' proficiency levels and learning speeds (Settles et al., 2016). Similarly, AI-driven learning management systems (LMS) began employing predictive models to identify at-risk students and provide targeted interventions (Siemens et al., 2011).

Another significant development was the emergence of virtual assistants and chatbots in education. Tools like IBM's Watson and Microsoft's Cortana were employed to answer student queries, provide study support, and facilitate administrative tasks (Luckin et al., 2016). These technologies demonstrated AI's ability to enhance both academic and administrative aspects of education. In recent years, AI has continued to evolve, with a growing emphasis on ethical considerations and inclusivity. AI-driven tools now support diverse learners, including those with disabilities, through technologies like speech recognition and real-time translation (Holmes et al., 2019). Emerging trends such as generative AI, immersive learning environments, and AI-augmented teaching assistants hold promise for reshaping the educational landscape further. Looking ahead, the integration of AI in education is expected to deepen in the area of adoption and acceptance of AI literacy with applications in predictive analytics, personalized curriculum design, and lifelong learning.

Purpose of Research

The specific purpose of this study is:

1. examine the role of exposure to the adoption of artificial intelligence on enhancing distance learners' learning effectiveness;
2. investigate the challenges facing distance learners' adoption and acceptance of AI literacy;
3. ascertain the potential factors influencing the promotion of AI literacy adoption and acceptance among distance learners.

Research Questions

This study is based on the following research questions:

1. To what extent the role of exposure to the adoption of artificial intelligence on enhancing distance learners' learning effectiveness?
2. What are the challenges facing distance learners' adoption and acceptance of AI literacy?
3. What are the potential factors influencing the promotion of AI literacy adoption and acceptance among distance learners?

Literature Review

This study reviewed some related literature relevant to the study. The relevant literature available in journals, articles, books, and films, audio recording and so on, regarding scholarly opinions, constructs and findings, which give scholarly direction to the study, which are stated as follows:

Overview of Artificial Intelligence and Its Application in Education

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think, learn, and act autonomously (Russell & Norvig, 2020). AI technologies encompass a wide range of tools and techniques, including machine learning, natural language processing, computer vision, and robotics, which aim to replicate human cognitive functions such as decision-making, problem-solving, and language understanding. In recent years, AI has made remarkable advancements, transforming industries such as healthcare, finance, and education (Ng, 2021).

Applications of AI in Education

AI is revolutionizing the educational landscape by enhancing teaching, learning, and administrative processes. Its applications in education can be broadly categorized into personalized learning, administrative automation, student assessment, and teacher supports. AI enables personalized learning by merging educational content and instruction to meet the unique needs of each student. Intelligent Tutoring Systems (ITS) such as Carnegie Learning and DreamBox use AI algorithms to assess students' learning progress and provide customized lessons based on their strengths and weaknesses (Anderson et al., 2022). Automated assessment and feedback are very important, AI facilitates automated grading and feedback, reducing the workload for educators and providing students with immediate insights. Tools like Turnitin and Gradescope utilize AI to evaluate essays and assignments, detecting errors in grammar, structure, and content coherence (Johnson et al., 2020). AI leverages learning analytics to monitor students' academic performance

and predict potential challenges. Educational institutions use AI systems to analyze large datasets, such as attendance records and test scores, to identify at-risk students and intervene proactively (Siemens, 2021). For instance, platforms like Brightspace and Moodle employ AI to generate reports that help educators make data-driven decisions. AI is also crucial in Virtual Learning Environments (VLEs) as it enhances the interactivity and effectiveness of online education. Chatbots, such as Ada and IBM Watson Tutor, provide instant support to students by answering queries and guiding them through course materials (Luckin et al., 2020). AI also facilitates immersive learning experiences through augmented reality (AR) and virtual reality (VR) technologies.

Additionally, AI supports inclusive education by addressing the needs of students with disabilities. For example, speech recognition systems like Google's Live Transcribe aid hearing-impaired students by converting spoken language into text in real-time. Similarly, AI-driven assistive technologies, such as text-to-speech applications, help students with visual impairments or learning disabilities (World Economic Forum, 2022). Lastly, AI assists educators by automating routine tasks and providing professional development opportunities. Tools like Microsoft Azure and OpenAI's GPT-4 help teachers design lesson plans, generate educational resources, and develop strategies for differentiated instruction. Additionally, AI-powered training platforms enable teachers to refine their skills through interactive simulations and feedback (Holmes et al., 2019).

Types of AI Technologies Used in Teaching and Learning

Artificial Intelligence (AI) technologies have changed the educational landscape by creating innovative solutions to enhance teaching and learning. These technologies address diverse needs in education, from personalizing learning experiences to automating administrative tasks. By leveraging AI, educators and learners benefit from tools that are adaptive, interactive, and efficient. The types of AI technologies used in learning can be categorized into certain key areas, each with unique applications and contributions. One of the earliest and most significant applications of AI in education is the Intelligent Tutoring Systems (ITS). These systems provide personalized instruction and feedback to learners, emulating the role of human tutors. By analyzing student behavior, ITS platforms identify knowledge gaps and tailor content delivery to individual needs. For example, the “Cognitive Tutor” developed by Anderson et al. (1995) helps students improve

mathematical skills by offering customized problem-solving exercises. ITS has proven particularly effective in STEM education, where individualized attention is critical for mastering complex concepts (VanLehn, 2011).

Another widely used AI technology is Natural Language Processing (NLP), which enables machines to understand and generate human language. AI Platforms like Grammarly use NLP to help learners enhance their writing skills by providing instant feedback on grammar, syntax, and style (Leacock et al., 2014). Similarly, language-learning applications such as Duolingo leverage NLP to create interactive lessons and simulate conversational practice, making language acquisition more engaging and effective (Settles et al., 2016). Machine Learning (ML) and predictive analytics are also critical in education. ML algorithms analyze vast amounts of data from learners' interactions with educational platforms to identify patterns and predict outcomes. Predictive analytics, a subset of ML, helps educators identify students at risk of poor performance or dropout. For example, platforms like Blackboard Predict use data such as attendance, assignment submissions, and test scores to forecast student performance and recommend timely interventions (Siemens et al., 2011). These technologies enable educators to make informed decisions and provide targeted support to students.

Modern Learning Management Systems (LMS) such as Moodle and Canvas, increasingly integrate AI technologies to enhance functionality. AI-enabled LMS platforms offer personalized course recommendations, adaptive assessments, and progress tracking. By analyzing engagement levels, these systems create customized learning experiences that align with students' preferences and goals (Kay et al., 2006). Additionally, LMS platforms automate grading and feedback, reducing the administrative burden on educators while ensuring timely responses for learners. Another emerging area is Virtual and Augmented Reality (VR/AR), powered by AI. These immersive technologies create interactive learning environments that simulate real-world scenarios, enhancing understanding and retention. For instance, AI-driven VR platforms allow medical students to practice surgical procedures in a risk-free virtual setting, while AR applications overlay historical information onto physical locations, making history lessons more engaging (Wu et al., 2013). By combining AI with VR/AR, education becomes more experiential and accessible. Chatbots and virtual assistants! Have gained prominence in education for their ability to provide 24/7 support. These AI-driven tools assist students by answering queries, guiding them through

course content, and even performing administrative tasks. IBM Watson, for example, has been implemented in educational institutions to support both academic and non-academic needs, such as clarifying course schedules or providing study resources (Luckin et al., 2016).

Content recommendation systems are another important application of AI in learning. These systems analyse user behavior and preferences to suggest personalized learning materials. Platforms like Khan Academy use AI algorithms to recommend video lessons, exercises, and resources tailored to individual learners' needs (Siemens et al., 2011). By delivering relevant content, these systems enhance learner engagement and efficiency. Finally, speech recognition and accessibility tools play a vital role in making education inclusive. Speech recognition technologies, such as Dragon Naturally Speaking, allow students with physical disabilities to interact with educational platforms using voice commands. Similarly, tools like Google Translate facilitate real-time language translation, breaking down barriers in multilingual classrooms (Holmes et al., 2019). These technologies ensure that education is accessible to all, regardless of linguistic or physical challenges.

Methods and Materials

This study employed a systematic literature review (SLR) to investigate the adoption and acceptance of artificial intelligence literacy for enhancing learning effectiveness among distance learners in Nigeria, utilizing a transparent and replicable process. The review encompassed major databases, peer-reviewed journals, conference papers, and manual searches using key terms such as e-learning, online learning, AI in education, ICT, and digital teaching tools in Nigeria (Moher et al., 2009). Empirical studies, theoretical papers, policy reports, and book chapters published in English and focusing on e-learning, distance education, or AI in educational contexts were included. The inclusion criteria encompassed both Nigerian and international studies relevant to AI in ODL, while unpublished and non-English articles, duplicates, and studies unrelated to education were excluded. The search was conducted in databases like Scopus, Web of Science, Google Scholar, and ResearchGate. Titles and abstracts were screened for relevance, followed by full-text reviews against the criteria. Articles were assessed for clarity, methodological rigor, and relevance to AI integration. Thematic synthesis extracted key details and findings on learning outcomes of adoption and acceptance of artificial intelligence literacy among distance learners, ensuring local perspectives were represented (Thomas & Harden, 2008).

Results and Discussion**The Role of Exposure to Learners' Adoption and Acceptance of Artificial Intelligence Literacy in Enhancing Learners' Learning Effectiveness**

Exposure plays a fundamental role in raising learners' awareness of artificial intelligence (AI), a rapidly advancing field that is reshaping industries, societies, and individual lives. Awareness of AI is influenced by various factors, such as access to information, engagement with AI-driven technologies, educational initiatives, and the portrayal of AI in media and culture. Below are some of the roles of exposure in fostering learners' awareness of AI and the mechanisms through which individuals and communities become more informed about its capabilities, implications, and potential challenges. One of the most significant ways exposures enhance learners' awareness of AI is through the widespread adoption of AI-driven technologies in everyday life. Tools like virtual assistants (for example, Siri, Alexa), recommendation systems on streaming platforms, and AI-powered chatbots introduce individuals to AI applications, often without explicit recognition of the underlying technology. Exposure to these tools fosters familiarity and practical understanding of AI's functionalities and benefits (Brynjolfsson & McAfee, 2017). For instance, when individuals use AI-powered navigation systems or translation apps, they gain firsthand experience of AI's capabilities, which enhances their awareness of its potential to solve real-world problems. Brynjolfsson and McAfee (2017) argue that the integration of AI into everyday tools helps bridge the gap between technological innovation and user awareness, making AI more accessible and relatable to the general public.

Education and Training Programmes of Learners' Exposure to AI Usage

Educational exposure to AI through formal training, workshops, and online courses is another critical factor in raising awareness, adoption and acceptance. Institutions and organizations are increasingly incorporating AI literacy into curricula, aiming to equip individuals with foundational knowledge about AI technologies, ethical considerations, and real-world applications (Russell & Norvig, 2021). Such exposure not only enhances awareness but also empowers individuals to engage critically with AI. For example, initiatives like AI4ALL, which target underrepresented groups, aim to democratize AI knowledge by exposing students to AI concepts and encouraging them to explore careers in the field. Russell and Norvig (2021) highlight that structured educational exposure can help demystify AI, fostering a deeper understanding of its technical and societal

implications. Exposure to AI in professional settings is another key driver of awareness, adoption and acceptance. As organizations increasingly adopt AI to automate tasks, enhance decision-making, and improve efficiency, employees are exposed to AI systems such as predictive analytics, machine learning algorithms, and robotic process automation (Bessen, 2019). This exposure not only raises awareness of AI's capabilities but also highlights its implications for workforce dynamics and skill requirements. Bessen (2019) emphasizes that workplace exposure to AI fosters practical understanding, as employees interact with AI tools and observe their impact on productivity and workflows. This type of exposure often leads to increased curiosity and engagement with AI, prompting individuals to seek further knowledge about its underlying mechanisms and broader implications.

Governments, non-profit organizations, and industry stakeholders play a vital role in increasing exposure to AI through public awareness campaigns and policy initiatives. These efforts aim to educate the public about AI's benefits, challenges, and ethical considerations, fostering informed discussions and promoting responsible AI adoption (Jobin et al., 2019). For instance, organizations like UNESCO and the European Union have launched initiatives to promote AI literacy and awareness, emphasizing the importance of understanding AI's ethical and societal dimensions. Jobin et al. (2019) argue that such initiatives are crucial for ensuring that individuals and communities are equipped to navigate the complexities of AI in an informed and responsible manner.

Social Media and Online Communities of Learners' Exposure Influence on AI Usage

Social media platforms and online communities are increasingly influential in exposing individuals to AI-related topics. Platforms like Twitter, LinkedIn, and Reddit host discussions, share news, and provide educational content about AI, making it accessible to diverse audiences (Van Dijck et al., 2018). These platforms also enable experts, practitioners, and enthusiasts to share insights and resources, fostering a global conversation about AI. Van Dijck et al. (2018) highlight that social media exposure often serves as an entry point for individuals who may not have formal training in AI but are interested in its applications and implications. The interactive nature of these platforms encourages users to engage with content, ask questions, and share their perspectives, thereby deepening their awareness and understanding.

Exposure is a critical factor in fostering adoption and acceptance of artificial intelligence, shaping

how individuals and communities perceive and understand its capabilities, challenges, and implications. Access to AI-driven technologies, educational initiatives, media portrayals, workplace integration, public campaigns, social media engagement, and ethical debates all contribute to building awareness. By increasing exposure through diverse channels, stakeholders can ensure that individuals are better equipped to navigate the complexities of AI and engage with its transformative potential responsibly. The integration of Artificial Intelligence (AI) into educational frameworks holds significant promise for enhancing learning experiences. However, among undergraduates, particularly in Nigeria and broader African contexts, several barriers impede the adoption and acceptance of AI technologies. These challenges span across infrastructural deficits, limited access to technology, insufficient awareness, and ethical concerns.

Challenges Facing Learners' Adoption and Acceptance of AI Literacy

A primary obstacle to AI adoption in African educational institutions is inadequate infrastructure. Many universities grapple with limited internet connectivity, unreliable power supply, and outdated technological resources, which are essential for effective AI integration. A study by Mohammed and Shehu (2023) highlights that sectors such as health, energy, agriculture, and finance in Nigeria face significant challenges due to infrastructural limitations, which, by extension, affect educational institutions' capacity to adopt AI technologies.

Limited Access to Technology

Beyond infrastructure, there is a notable scarcity of access to advanced technological tools among undergraduates. Alimi et al. (2021) found that a majority of university students in Kwara State are not aware of AI applications for learning, attributing this unawareness to limited access to necessary digital resources. This lack of exposure hinders students' ability to engage with and utilize AI tools effectively.

Insufficient Awareness and Training

Even when infrastructural and access issues are addressed, a significant barrier remains in the form of insufficient awareness and training. Many undergraduates are not adequately informed about the potential applications and benefits of AI in their studies. A study focusing on Library and Information Science educators in Nigerian higher institutions reveals that while there is a high level of awareness of AI tools, actual usage for teaching purposes remains limited, suggesting a gap between awareness and practical application.

Ethical and Privacy Concerns

Ethical considerations, particularly regarding data privacy, also pose significant challenges. Undergraduates often express concerns about how their data is collected, stored, and utilized by AI systems. These apprehensions can lead to reluctance in adopting AI tools. A study by Kayode and Odumabo (2024) highlights that while AI technologies offer numerous benefits, there are challenges related to data governance and privacy that need to be addressed to facilitate broader adoption in educational settings. Addressing these barriers requires a multifaceted approach. Improving infrastructural facilities, enhancing access to technological tools, providing comprehensive training programs, and establishing clear ethical guidelines are essential steps toward fostering AI adoption among undergraduates in Nigeria and across Africa. By tackling these challenges, educational institutions can better prepare students to engage with and benefit from AI technologies, thereby enhancing the overall learning experience.

Potential Factors Influencing the Promotion of AI Literacy Adoption and Acceptance

The following are the potential factors influencing the promotion of AI literacy adoption and acceptance:

Technological Infrastructure and Accessibility

The availability of robust technological infrastructure is crucial for AI adoption. In regions where internet connectivity and access to digital devices are prevalent, undergraduates are more likely to engage with AI tools. A study by Ahmed and Bolajoko (2024) highlights that the lack of adequate technological resources in certain African institutions hampers the effective utilization of AI technologies. This challenge is further compounded by erratic power supply, high data costs, and limited access to AI research centers in Nigeria and other parts of Africa (Ahmed & Bolajoko, 2024).

Curriculum Integration and Educational Policies

The study discovers that universities where AI and machine learning courses are integrated. Incorporating AI-related courses into university curricula enhances students' exposure and competence in AI. Onwuagboke et al. (2024) emphasize the importance of embedding AI education into academic programmes to prepare students for the evolving technological landscape. Into the curriculum have significantly higher levels of student engagement with AI applications (Onwuagboke, Nnajieta, Nzeako, & Umune, 2024). However, many African universities still lack

structured AI courses, which limits students' formal exposure to AI concepts.

Faculty Awareness and Training

Lecturers' familiarity with AI tools significantly impacts their integration into teaching. Onwuagboke et al. (2024) explain that while there is a general awareness of AI tools among lecturers, continuous professional development is necessary to keep pace with technological advancements. In many Nigerian universities, faculty members lack the necessary training and exposure to AI tools for academic and research purposes (Onwuagboke et al., 2024). Training workshops and AI literacy programs for lecturers can help bridge this gap.

Perceived Usefulness and Ease of Use

The Technology Acceptance Model (TAM) posits that perceived usefulness and ease of use are primary determinants of technology adoption. A study by Ahmed and Bolajoko (2024) reveals that undergraduates are more inclined to adopt AI tools they find beneficial and user-friendly. AI-based applications such as ChatGPT, Google Bard, and Grammarly are widely used by students because of their ease of accessibility and practical benefits in research and assignments (Ahmed & Bolajoko, 2024).

Peer Influence and Collaborative Learning

Peer networks play a pivotal role in disseminating information about AI tools. Collaborative learning environments encourage the sharing of knowledge and resources, thereby increasing AI adoption among students. Ahmed and Bolajoko (2024) note that students often rely on peer recommendations when exploring new technologies. Study groups and AI-focused clubs in universities have been instrumental in raising awareness and promoting the use of AI tools among students (Ahmed & Bolajoko, 2024).

Institutional Support and Resources

Support from educational institutions, such as providing access to AI tools and creating awareness programs, facilitates adoption. Onwuagboke et al. (2024) recommend that universities should invest in AI infrastructure and training to promote effective utilization. In many African universities, AI adoption remains limited due to a lack of investment in computational facilities, inadequate funding for AI research, and insufficient access to AI labs (Onwuagboke et al., 2024).

Societal Attitudes and Cultural Perceptions

Societal beliefs and cultural attitudes towards technology influence AI adoption. In some African

contexts, skepticism towards new technologies can impede acceptance. Ahmed and Bolajoko (2024) highlight the need for culturally-sensitive approaches to promote AI awareness. For example, in certain communities, AI is sometimes perceived as a threat to employment, leading to resistance among students and lecturers alike (Ahmed & Bolajoko, 2024).

Globalization and Exposure to International Trends

Exposure to global technological trends through international collaborations and online platforms increases awareness and interest in AI among undergraduates. Ahmed and Bolajoko (2024) observe that students who engage with international academic communities are more likely to adopt AI tools. The rise of online AI-related courses on platforms such as Coursera, Udemy, and edX has contributed significantly to the awareness and adoption of AI technologies among African students (Ahmed & Bolajoko, 2024).

Government Policies and National Initiatives

Governmental support through policies and initiatives that promote AI education and research can significantly enhance adoption. The African Union's Agenda 2063 underscores the importance of leveraging technology for development, which includes fostering AI competencies among the youth. The Nigerian government, through the National Information Technology Development Agency (NITDA), has launched initiatives aimed at promoting AI awareness and digital literacy (Afolabi, 2024). However, implementation gaps and policy inconsistencies remain major challenges.

Conclusion

The acceptance and adoption of AI literacy among distance learners in African society towards their learning effectiveness are influenced by multiple factors, including technological infrastructure, educational policies, faculty training, peer influence, institutional support, and government initiatives. Addressing these areas through targeted strategies, such as curriculum integration, faculty development, and policy reforms, can significantly enhance AI integration in higher education across the continent, Nigeria in particular. This in essence, will enable learners to become self-regulated, think critically, receive more personalized learning experiences, and improve their learning outcomes.

Recommendations

Based on the above-mentioned numerous benefits and opportunities embedded in the adoption and

acceptance of AI usage aforementioned above, the following recommendations were made:

1. Computer appreciation courses should be included in the curriculum at all level so as to learn application packages that would enhance learners in AI application in education.
2. The learners and tutors should be mandated to attend training and re-training on AI application in education in order to deliver efficiently and effectively in ODL teaching and learning.
3. Both the learners and the tutors must update their knowledge in advanced ICT skills needed in the digital age in order to fully maximize and utilize the features of AI application in education.
4. The management of the ODL institutions should endeavor to formulate a functional policy geared towards improving as well as enhancing AI usage in ODL in order to encourage more participants in open-distance learning programmes in this digital age.

References:

1. Afolabi, A. (2024). Ethical issues in artificial intelligence adoption in African higher education institutions in Nigeria. *African Journal of Information and Knowledge Management*, 3(2), 22–33.
https://www.researchgate.net/publication/381989604_Ethical_Issues_in_Artificial_Intelligence_Adoption_in_African_Higher_Education_Institutions_in_Nigeria
2. Ahmed, A. O., & Bolajoko, A. M. (2024). Awareness, availability, and utilisation of artificial intelligence technology among LIS educators in Ebonyi State. *Library Philosophy and Practice*, 1–15.
https://www.researchgate.net/publication/383201813_Awareness_Availability_and_Utilisation_of_Artificial_Intelligence_Technology_among_LIS_Educators_in_Ebonyi_State
3. Alimi, A. E., Buraimoh, O. F., Aladesusi, G. A., & Babalola, E. O. (2021). University students' awareness of, access to, and use of artificial intelligence for learning in Kwara State. *Indonesian Journal of Teaching in Science*.
4. Anderson, J. R., Corbett, A. T., Koedinger, K. R., & Pelletier, R. (1995). Cognitive tutors: Lessons learned. *Journal of the Learning Sciences*, 4(2), 167–207.
https://doi.org/10.1207/s15327809jls0402_2
5. Anderson, J. R. (2010). *Cognitive psychology and its implications* (7th ed.). Worth Publishers.

6. Bessen, J. E. (2018). *AI and jobs: The role of demand* (NBER Working Paper No. 24235). National Bureau of Economic Research. <https://doi.org/10.3386/w24235>
7. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W. W. Norton & Company.
8. Carbonell, J. R. (1970). AI in CAI: An artificial-intelligence approach to computer-assisted instruction. *IEEE Transactions on Man-Machine Systems*, 11(4), 190–202. <https://doi.org/10.1109/TMMS.1970.299942>
9. D'Mello, S. K., & Graesser, A. (2024). Intelligent tutoring systems: How computers achieve learning gains that rival human tutors. In P. A. Schutz & K. R. Muis (Eds.), *Handbook of educational psychology* (4th ed., pp. 603–629). Routledge.
10. Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.
11. Jobin, A., Ienca, M., & Vayena, E. (2019). The global landscape of AI ethics guidelines. *Nature Machine Intelligence*, 1, 389–399. <https://doi.org/10.1038/s42256-019-0088-2>
12. Johnson, M., Smith, R., & Patel, K. (2020). The role of AI in automating assessment and feedback in higher education. *Educational Technology Research and Development*, 68(5), 1001–1020.
13. Kay, J., Kummerfeld, B., & Lauder, P. (2006). Personis: A server for user modeling. *International Journal of User Modeling and User-Adapted Interaction*, 15(3–4), 259–304.
14. Kayode, A. E., & Odumabo, A. T. (2024). The impact and challenges of artificial intelligence technologies on universities in southwestern Nigeria. *The European Conference on Education 2024: Official Conference Proceedings*, 1–15. https://papers.iafor.org/wp-content/uploads/papers/ece2024/ECE2024_82271.pdf
15. Leacock, C., Chodorow, M., Gamon, M., & Tetreault, J. (2014). *Automated grammatical error detection for language learners*. Springer. <https://doi.org/10.1007/978-3-031-02153-4>
16. Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson. <https://static.googleusercontent.com/media/edu.google.com/en//pdfs/Intelligence-Unleashed-Publication.pdf>

17. McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (1955). *A proposal for the Dartmouth summer research project on artificial intelligence*.
<http://jmc.stanford.edu/articles/dartmouth/dartmouth.pdf>
18. Mohammed, K., & Shehu, A. (2023). A review of artificial intelligence (AI) challenges and future prospects of explainable AI in major fields: A case study of Nigeria. *Open Journal of Physical Science*, 4(1), 1–18.
19. Ng, A. (2021). *AI transformation playbook: From strategy to execution*. Stanford University Press.
20. Onwuagboke, B. B. C., Nnajieto, C. C., Nzeako, R., & Umune, H. (2024). Lecturers' awareness of artificial intelligence tools for teaching and research in Alvan Ikoku Federal University of Education, Nigeria. *African Journal of Humanities & Contemporary Education Research*, 17(1), 1–15.
https://www.researchgate.net/publication/385677077_Lecturers_Awareness_of_Artificial_Intelligence_Tools_for_Teaching_and_Research_in_Alvan_Ikoku_Federal_University_of_Education_Nigeria
21. Russell, S., & Norvig, P. (2020). *Artificial intelligence: A modern approach* (4th ed.). Pearson.
22. Settles, B., Brust, C., Gustafson, E., Hagiwara, M., & Madnani, N. (2016). Second language acquisition modeling. *Proceedings of the International Conference on Artificial Intelligence in Education*, 614–617.
23. Siemens, G., Dawson, S., & Lynch, G. (2011). *Improving the quality and productivity of the higher education sector*. Society for Learning Analytics Research.
24. Siemens, G. (2021). Learning analytics and educational data mining: Implications for the future of learning. *Journal of Learning Analytics*, 8(2), 45–57.
25. Turing, A. M. (1950). Computing machinery and intelligence. *Mind*, 59(236), 433–460.
26. VanLehn, K. (2011). The relative effectiveness of human tutoring, intelligent tutoring systems, and other tutoring systems. *Educational Psychologist*, 46(4), 197–221.
27. Van Dijck, J., Poell, T., & de Waal, M. (2018). *The platform society: Public values in a connective world*. Oxford University Press.
28. Woolf, B. P. (1992). AI in education. *Artificial Intelligence Review*, 7(1), 3–18.
29. World Economic Forum. (2022). *AI and accessibility in education*. <https://www.weforum.org>

30. Wu, H. K., Lee, S. W. Y., Chang, H. Y., & Liang, J. C. (2013). Current status, opportunities, and challenges of augmented reality in education. *Computers & Education*, 62, 41–49.

Received: Apr 03, 2026

Accepted: May 15, 2026

Published: Jul 01, 2026

Adoption and Acceptance of Artificial Intelligence Literacy for Enhancing Learning Effectiveness Among Distance Learners in Nigeria, authored by Muibi, T.G., is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (CC BY-NC-ND 4.0).